the human eye to allow the surgeon to view normal visible images and the selected pattern of the patient in post processing for either still or full motion images. Surgeons may also use these techniques in conjunction with thermal images when the desired wavelengths are properly selected for radiological treatment applications where heat is generated by radioactive treatment materials.

[0134] Referring now to FIGS. **39** and **40**, as discussed above, the virtual calibration pattern can have any desired shape, such as the shape of a cube, portions of concentric cylinders, portions of concentric spheres, etc., depending on the geometry of the desired object **164** and the field of view of one or more optical recorders. For the same reasons, the holographic calibration plate **178** can have any desired shape. A single optical recorder **162***a* or multiple optical recorders **162***a*-**162***c* can use a rectangular, spherical, cylindrical or arbitrarily shaped hologram, illuminated by light source **158** from either the inside or outside of the holographic calibration plate that surrounds or partially surrounds the desired object **164**. In FIG. **39**, the optical recorder **164***a* moves around the outside of the cylindrical holographic calibration plate **260** through which a cylindrical virtual calibration pattern **262** is viewed. Successive images of the desired object **164** are post processed into a stereoscopic image or into a three-dimensional model of the object using algorithms for color and or edge matching. These stereoscopic images of the desired object **164** can be used to capture the three-dimensional shape of the desired object **164** by means of calculation by triangulation and the spatial position of uniquely determined points on the desired object **164**, e.g., points for a wire frame model. Color, texture and shading are then applied to the wire frame model from the captured images of the desired object **164**.

[0135] Referring now to FIG. **40**, a spherical-shaped holographic calibration plate **264** is used in generating a partially spherical calibration hologram **266** of a partially-spherical calibration grid, i.e., a spherical coordinate grid, around one or more optical-recorders **164***a*. The three-dimensional calibration equipment **16** of this configuration is well suited to applications requiring a complete field of view. Multiple optical recorders **164***a*-**164***c* can be placed within the spherical holographic calibration plate **264** to simultaneously cover all directions. Such a spherical calibration hologram **266** provides the mechanism to overcome the problems of adjacent optical recording devices that record two-dimensional images, which include overlapping fields of view and conformal mapping from the planar segment of the optical recording device to a spherical frame of reference. Using a holographic calibration pattern in the form of a spherical coordinate grid in the field of view of the optical recorders enhances the conformal mapping of the multiple optical recorder outputs. The spherical calibration hologram **164** provides a matching point between the field of view of the adjacent optical recorders and provides a uniform coordinate system across all the optical recorders, which simplifies calibration and alignment of the optical recorders and simplifies conformal mapping across the optical recorders, especially when the alignment between such devices are vary due to shock, vibration or acceleration. The spherical calibration hologram **266**, when combined with laser ranging to be discussed below in connection with FIG. **41**, provides accurate ranging to a desired object **164**.

[0136] The spherical holographic calibration configuration of FIG. **40** provides the three-dimensional calibration equipment **16** with the necessary data for generating a panoramic three-hundred sixty degree view of remotely piloted vehicles subject to shock or acceleration. The spherical holographic calibration configuration enables real-time compensation for the two major problems when providing a panoramic three-hundred sixty degree view for remotely piloted vehicles: (i) the continuous alignment of multiple "fisheye" optical recorders which are subject to misalignment by shock or vibration, and (ii) conformal mapping of multiple optical recorders into a three-hundred sixty degree panoramic view. Furthermore, the calibration wavelengths **170** can be chosen to include wavelength used in collision avoidance systems and thus process such information jointly with optical recorder calibration.

[0137] Referring now to FIG. **41**, a fourth exemplary embodiment of the three-dimensional calibration equipment **268** is depicted. The three-dimensional calibration equipment **268** includes a laser pointer **270**, optical recorders **272***a*-**272***c*, a light source **274**, and a cylindrical holographic calibration plate **276**. The optical recorders **272***a*-**272***c* separate the desired and calibration wavelengths to enable efficient extraction of the desired object's color in addition to its three dimensional shape. For the calibration equipment **268**, the three optical recorders **272***a*-**272***c* move around the outside of the cylindrical holographic calibration plate **276** in order to capture and triangulate the position in three-dimensional space of a point P on a desired object **278** which is illuminated by a laser pointer **270** operating at a calibration wavelength **280**. This is an improvement over stereoscopic color matching or edge matching, as the point P is precise. Furthermore, when combined with holographic calibration technique of FIG. **38**, the position of point P can be inferred from its position relative to a virtual calibration pattern **282**. Since the processing of the object color information using the laser **270** is independent of processing of the spatial information using the virtual calibration pattern **282**, the three-dimensional calibration equipment **268** is capable of capturing the object's shape. Although a desired object's shape and color can be recorded with a single optical recorder **272***a*, multiple optical recorders **272***a*-**272***c* provides increased speed and accuracy.

[0138] Still referring to FIG. **41**, the simple laser pointer **270** can be replaced with a laser ranging measurement device **284**. The laser ranging measurement device **284** provides accurate ranges to any point P on the surface of the desired object **278**. By choosing a wavelength for the laser ranging measurement device **284** that is a calibration wavelength, the point P illuminated by the laser ranging measurement device **284** is observable at the same time as the virtual calibration pattern **282**. The embodiment of FIG. **41** uses the virtual calibration pattern **282** to position the laser pointer **270** or the laser ranging measurement device **284** at desired points on the virtual calibration pattern **282**. In a calibration method for use with the three-dimensional calibration equipment **268** employing either the laser pointer **270** or the laser ranging measurement device **284**, the virtual calibration pattern **282** is chosen to be a grid on a plane that intersects the desired object **278**. The laser generated point P is to be positioned on the surface of the desired object **278** at grid points nearest to the spatial positions where the grid intersects the desired object **278**.

[0139] Referring now to FIG. **42**, the calibration method for use with the three-dimensional calibration equipment **268** can be summarized as follows: At step **286**, a virtual